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09/622,401	08/16/2000	Hans Goran Evald Martin	P/3658-10	3531

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EXAMINER	
LEE, SHUN K	
ART UNIT	**PAPER NUMBER**
2878	

DATE MAILED: 01/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/622,401	MARTIN ET AL.	
	Examiner	Art Unit	
	Shun Lee	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 August 2000* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 August 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 1 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

National Stage Application

1. The Examiner acknowledges consideration of the International Preliminary Examination Report in International Application PCT/SE099/00145. MPEP § 1893.03(e).

Information Disclosure Statement

2. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Drawings

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "31" has been used to designate both base surface (pg. 24, line 12 (Figs. 1, 3, 4, 6a, and 7) and detector (pg. 32, line 28 and Fig. 15). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: M12" and M21" (Fig. 4), a1' and am' (Fig. 12), and 92 (Fig. 13). A proposed drawing

correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

5. The disclosure is objected to because of the following informalities:

(a) in line 13 on pg. 22, "Figure 2" should probably be --Figure 1--; and

(b) in line 19 on pg. 31, "heat–absorbent coating" should probably be --heat reflecting layer-- (37 CFR 1.84(p)(4)).

Appropriate correction is required.

6. The incorporation of essential material in the specification by reference (pg. 23, lines 3-5) to a foreign application or patent, or to a publication is improper. Applicant is required to amend the disclosure to include the material incorporated by reference. The amendment must be accompanied by an affidavit or declaration executed by the applicant, or a practitioner representing the applicant, stating that the amendatory material consists of the same material incorporated by reference in the referencing application. See *In re Hawkins*, 486 F.2d 569, 179 USPQ 157 (CCPA 1973); *In re Hawkins*, 486 F.2d 579, 179 USPQ 163 (CCPA 1973); and *In re Hawkins*, 486 F.2d 577, 179 USPQ 167 (CCPA 1973).

7. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is

requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

8. Claims 28 and 30 are objected to because of the following informalities:

(a) in claim 28 (line 4 on pg. 41), "(6)" should probably be --(G)--; and

(b) in claim 30 (line 32 on pg. 41), "the" should probably be deleted.

Appropriate correction is required.

9. Applicant is advised that should claim 33 be found allowable, claim 34 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 112

10. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

11. Claims 8 and 12 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification fails to describe what parts of said

base unit related structure is applied to a surface part on the inside of said second cell part.

12. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

13. Claims 1-54 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.

Regarding claims 1, 27, 28, and 54, the phrase "such as" renders the claims indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim 1 recites the limitation "said surface structure" in line 21 on pg. 34. There is insufficient antecedent basis for this limitation in the claim.

Claim 2 recites the limitation "a light receiving means (3) are arranged adjacent and outside said second part (2A)" which directly contradicts the limitation "said thermal element is enclosed by said second part (2A)". It is noted that claim 1 recites the limitation "said detector (3) is a thermal element". Thus it can be concluded that element 3 has been denoted as "detector-arrangement", "detector", and "light receiving means" which is vague and indefinite. Further, claim 29 recite that element 3 is both <u>enclosed</u> by element 2A and <u>outside</u> element 2A which is physically impossible.

Regarding claims 6 and 7, the phrase "such as" and the phrase "or like" render the claims indefinite because it is unclear whether the limitations following the phrases are part of the claimed invention. See MPEP § 2173.05(d).

Claim 8 recites the limitation "said base unit related structure" in line 15 on pg. 36 and the limitation "said second cell part" in line 16 on pg. 36. There is insufficient antecedent basis for these limitations in the claim.

Claim 9 recites the limitation "said first cell part" in lines 19-20 on pg. 36 and the limitation "said detector-associated surface parts" in lines 20-21 on pg. 36. There is insufficient antecedent basis for these limitations in the claim.

Claim 12 recites the limitation "said second cell part" in line 35 on pg. 36. There is insufficient antecedent basis for this limitation in the claim.

Claim 15 recites the limitation "said base unit" in line 34 on pg. 37. There is insufficient antecedent basis for this limitation in the claim.

Claim 18 recites the limitation “said conductive surface section is connected electrically with interconnecting ridges belonging to adjacent columns but electrically insulated in other respects from said adjacent columns” which is vague and indefinite.

Claim 19 recites the limitation "the intermediate layer" in line 1 on pg. 39. There is insufficient antecedent basis for this limitation in the claim.

Claim 25 recites the limitation "said first cell part" in line 7 on pg. 40. There is insufficient antecedent basis for this limitation in the claim.

Claim 26 recites the limitation "said second cell part" in line 11 on pg. 40. There is insufficient antecedent basis for this limitation in the claim.

Regarding claims 27 and 54, the phrase "Bolometer related" renders the claims indefinite because it is unclear whether the detector is a bolometer. Also claims 27 and 54 recite the limitation "having a topographical structure; covered with an electrically conductive metal layer" which is indefinite because it is unclear what has a topographical structure and what is covered with an electrically conductive metal layer.

Claim 28 recites the limitation "said surface structure" in line 15 on pg. 41. There is insufficient antecedent basis for this limitation in the claim. Further, claim 28 is an apparatus claim and the limitation "each of said first and second electrically conductive metal layer is applied to said surface structure at an angle of incidence other than 90°" is a method of applying a metal layer and thus fails to particularly point out a structural limitation. It should further be noted that claim 30 (which depends from claim 28) also recites the limitation of a method of applying a metal layer and thus fails to particularly point out a structural limitation.

Claim 29 recites the limitation "a light receiving means (3) are arranged adjacent and outside said second part (2A)" which directly contradicts the limitation "said thermal element is enclosed by said second part (2A)". It is noted that claim 28 recites the limitation of "detector-arrangement (3)" and "said detector is a thermal element". Thus it can be concluded that element 3 has been denoted as "detector-arrangement", "detector", and "light receiving means" which is vague and indefinite. Further, claim 29 recite that element 3 is both enclosed by element 2A and outside element 2A which is physically impossible.

Regarding claims 33 and 34, the phrase "such as" and the phrase "or like" render the claims indefinite because it is unclear whether the limitations following the phrases are part of the claimed invention. See MPEP § 2173.05(d).

Claim 35 recites the limitation "said second cell part" in lines 9-10 on pg. 43. There is insufficient antecedent basis for this limitation in the claim.

Claim 36 recites the limitation "said first cell part" in lines 13-14 on pg. 43 and the limitation "said detector-associated surface parts" in line 14 on pg. 43. There is insufficient antecedent basis for these limitations in the claim.

Claim 39 recites the limitation "said second cell part" in line 29 on pg. 43. There is insufficient antecedent basis for this limitation in the claim.

Claim 45 recites the limitation "said conductive surface section is connected electrically with interconnecting ridges belonging to adjacent columns but electrically insulated from said adjacent columns in other respects" which is vague and indefinite.

Claim 46 recites the limitation "the metal layer" which is indefinite because it is unclear if this is the first or second metal layer.

Claim 52 recites the limitation "said first cell part" in line 6 on pg. 47. There is insufficient antecedent basis for this limitation in the claim.

Claim 53 recites the limitation "said second cell part" in line 10 on pg. 47. There is insufficient antecedent basis for this limitation in the claim.

14. Claims 15 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See

MPEP § 2172.01. The omitted structural cooperative relationships are: "surrounding surface sections belonging to said base unit" and other elements of the claim.

15. Claims 42 and 43 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: "surrounding surface sections of said base structure" and other elements of the claim. Further, claim 43 is an apparatus claim and the limitation of a method reciting application of a metal layer using insulating ridges and thus fails to particularly point out a structural limitation.

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

17. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

18. Claims 1-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peters *et al.* (US 5,550,375) in view of Baxter (US 4,111,717), Grinberg *et al.* (US 4,922,116), Matarese (US 3,908,263), and Tsing (DE 41 10 653 A1) in so far as understood.

In regard to claims **1**, **3**, and **4**, Peters *et al.* disclose (column 1, line 64 to column 2, line 15; Figs. 2 and 3) a method of forming a detector in co-action with a gas sensor and intended for detecting electromagnetic waves (column 1, lines 14-20), passing through a gas cell (1, 9, 12), wherein said gas cell defines a cavity which can enclose a volume of gas to be measured or evaluated, wherein a surface, or parts of a surface, that form wall-parts within said gas cell (1, 9, 12) or cavity is/are covered with one or more different metal layers with the intention of forming a surface which is highly reflective with regard to said electromagnetic waves (column 2, lines 31-35), and wherein said detector (8, 11) is a thermal element (*i.e.*, thermopile; column 3, lines 23-26), characterized in that a base section of a base structure (*e.g.*, cover plate or semiconductor substrate; column 2, lines 1-15 and 53-57) exposes said thermal element and forms one part of said gas cell (1, 9, 12), that a one-piece shaped part (*i.e.*, second or further part; column 2, lines 53-57) is formed to enclose said cavity and adapted to cover said base section having said thermal element and that a base structure related area outside said thermal element is used for electronic elements (*i.e.*, circuit arrangements and/or discrete components; column 2, lines 53-57). The method of Peters *et al.* lacks a detailed description of the thermopile being formed on an electrically non-conductive base structure having a topographical structure covered with

a first electrically conductive metal layer and a second electrically conductive layer which are intended to form the thermopile (*i.e.*, thermocouples formed by overlap of the first electrically conductive metal layer and the second electrically conductive layer), said first electrically conductive metal layer is applied to said surface structure at a first angle of incidence other than 90°, said second electrically conductive metal layer is applied to said surface structure at a second angle of incidence other than 90° and different to said first angle. Thermopiles are well known in the art. For example, Baxter teaches (column 2, line 65 to column 3, line 40) it is well known in the art that thermopiles comprise of a plurality of hot and cold thermocouple junctions formed by the joining of two electrical conductors of different composition such as for example chromium alloy or gold. Grinberg *et al.* teach an array of resistor bridges (*e.g.*, resistors, thermocouple junctions, Schottky junctions; column 5, lines 66-68) formed on an insulating substrate (column 5, lines 1-4) in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation (column 5, lines 52-55). Matarese teaches (Fig. 7; column 1, lines 31-60) to apply a metal layer to a surface structure at an angle of incidence other than 90° (*i.e.*, grazing angle) in order to simply and quickly form interdigitated electrodes. Tsing teaches (Fig. 1) that by application of two different layers, a plurality of thermoelectric junctions can be formed. Therefore, it would have been obvious to one having ordinary skill that the thermopile in the method of Peters *et al.* is formed as an array of resistor bridges (*i.e.*, thermocouple junction comprising overlap of a first electrically conductive metal layer and a second electrically conductive layer) on an insulating substrate (*i.e.*, electrically non-conductive

base structure having a topographical structure) by applying the first electrically conductive metal layer at a first grazing incidence angle and the second electrically conductive metal layer at a second grazing incidence angle different than the first angle in order to simply and quickly form the array of resistor bridges so as to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation as taught by Grinberg *et al.*

In regard to claim **2** which is dependent on claim 1, Peters *et al.* also disclose (column 2, lines 36-57) that said detector (8, 11) can be connected to said one-piece shaped (*i.e.*, second) part via a waveguide (*i.e.*, arranged adjacent and outside) or is integrated directly into (*i.e.*, enclosed by) said one-piece shaped part.

In regard to claim **5** which is dependent on claim 1, Peters *et al.* also disclose (column 2, lines 53-57) providing a detector (*i.e.*, IR radiation receiver) and electrical conductors and/or electrical circuits and/or electronic circuits (*i.e.*, electronic elements) within a limited surface area (*i.e.*, semiconductor substrate). The method of Peters *et al.* lacks an explicit description that the detector, electrical conductors, electrical circuits, and/or electronic circuits have been provided in the same way. Grinberg *et al.* teach (column 10, lines 37-50) that drive circuits and resistor bridges (*i.e.*, detectors) are provided on a semiconductor substrate using known techniques such as sputtering (*i.e.*, in the same way). Therefore, it would have been obvious to one having ordinary skill to form the thermopile and electronic elements in the method of Peters *et al.* using techniques known in the art such as sputtering.

In regard to claims **6** and **7** which are dependent on claim 5, Peters *et al.* also disclose (column 3, lines 45-58) that the one-piece shaped part has been produced by a LIGA process (*i.e.*, casting against a mold that has a complementary topographic structure, said mold is produced by electroplating process on a model, said model is produced by micromechanically working a substrate), and the configuration of said model is chosen to correspond to desired detector-associated surface parts, electric conductor paths, and/or electrical and/or electronic circuits (column 2, lines 36-57). The method of Peters *et al.* lacks an explicit description that the base structure (*e.g.*, cover plate or semiconductor substrate) has been produced by a LIGA process. Peters *et al.* also teach that the cover plate (12 in Fig. 3) reflects IR radiation (column 5, lines 28-31) and thus functions as an optical element. Peters *et al.* further teach that optical elements can be directly integrated (column 2, lines 36-42) as a shaped part using the LIGA process (column 3, lines 45-58). Therefore, it would have been obvious to one having ordinary skill to form the base structure in the method of Peters *et al.* using the LIGA process in order to incorporate optical elements as an integrated part of the base structure.

In regard to claim **8** which is dependent on claim 1, Peters *et al.* also disclose (column 2, lines 1-15) that the cover plate (*i.e.*, base structure) is applied to a surface section of the single-piece shaped (*i.e.*, second) part.

In regard to claim **9** which is dependent on claim 1, Peters *et al.* also disclose (column 2, lines 1-15) that a cover plate (*i.e.*, base structure) and surface of the detector form an integral part of the inner surface of said cavity (*i.e.*, in a sealing manner).

In regard to claim **10** which is dependent on claim 1, the method of Peters *et al.* lacks that the surface of the cavity and the detector-associated parts are coated with the same metal at the same time. Baxter teaches (column 3, lines 17-31) that the detector-associated parts of a thermopile are coated with a metal that serves the dual purpose of forming a cold thermocouple junction and a heat (*i.e.*, IR radiation) reflector.
Peters *et al.* teach (column 2, lines 31-35) that the surface of the cavity should be coated with metal layer having good reflectivity in the spectral range used (*i.e.*, IR radiation). Therefore, it would have been obvious to one having ordinary skill to coat the surface of the cavity and the detector-associated parts in the method of Peters *et al.* with the same metal at the same time in order to form the thermocouple junctions of the thermopile and to obtain a cavity surface having good reflectivity in the spectral range used (*i.e.*, IR radiation).

In regard to claim **11** which is dependent on claim 1, the method of Peters *et al.* lacks that said topographical structure is adapted to provide requisite connection pads belonging to said detector, electric conductor for paths, and/or electric and/or electronic circuits. Grinberg *et al.* teach (column 10, lines 18-30) that the topographical structure is adapted to provide requisite detector connection pads and circuit elements in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation (column 5, lines 52-55). Therefore, it would have been obvious to one having ordinary skill that the topographical structure in the method of Peters *et al.* provides the requisite detector connection pads and circuit elements in order to improve

thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation as taught by Grinberg *et al.*

In regard to claim **12** which is dependent on claim 8, the method of Peters *et al.* lacks that electric conductor paths and/or electric and/or electronic circuits are formed in said second part. Peters *et al.* teach (column 2, lines 36-57) that the detector (8, 11) can be integrated directly into a one-piece shaped (*i.e.*, second) part. Grinberg *et al.* teach (column 10, lines 18-30) that the topographical structure of the detector is adapted to provide requisite detector connection pads and circuit elements in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation (column 5, lines 52-55). Therefore, it would have been obvious to one having ordinary skill that the detector in the method of Peters *et al.* is integrated directly into a one-piece shaped second part with the requisite detector connection pads and circuit elements in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation as taught by Grinberg *et al.*

In regard to claims **13**, **17**, **18**, and **19** which are dependent on claim 3, the method of Peters *et al.* lacks a detailed description of the thermopile as an array (*i.e.*, n columns by m ridges) of conductive ridges (*i.e.*, having a first side surface coated with a first metal layer, a second side surface coated with a second metal layer, and an upper surface covered by overlap of the first metal layer and the second metal layer to form a thermocouple junction) with each conductive ridge electrically series interconnected by overlap of the first metal layer and the second metal layer (to form a thermocouple junction) at an intermediate conductive surface located between mutually adjacent

conductive ridges. Thermopiles are well known in the art. For example, Baxter teaches (column 2, line 65 to column 3, line 40) it is well known in the art that thermopiles comprise of a plurality of hot and cold thermocouple junctions formed by the joining of two electrical conductors of different composition such as for example chromium alloy or gold. Grinberg *et al.* teach an array of resistor bridges (*e.g.*, resistors, thermocouple junctions, Schottky junctions; column 5, lines 66-68) formed on an insulating substrate (column 5, lines 1-4) in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation (column 5, lines 52-55). Therefore, it would have been obvious to one having ordinary skill that the thermopile in the method of Peters *et al.* is formed as an array of conductive ridges (*i.e.*, having a first side surface coated with a first metal layer, a second side surface coated with a second metal layer, and an upper surface covered by overlap of the first metal layer and the second metal layer to form a thermocouple junction) with each conductive ridge electrically series interconnected by overlap of the first metal layer and the second metal layer (to form a thermocouple junction) at an intermediate conductive surface located between mutually adjacent conductive ridges in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation as taught by Grinberg *et al.*

In regard to claim **14** which is dependent on claim 13, the method of Peters *et al.* lacks that said detector-associated surface parts are positioned relative to incident light rays, or electromagnetic waves, so that said incident light rays will irradiate said upper surface of respective conductive ridges and such that said conductive ridges will

shadow said intermediate conductive surfaces against said incident light rays. Baxter teaches (column 3, lines 46-55) to provide a reflective area overlying a portion of the cold junctions in order to reduce the influence of stray radiation on the cold junctions. Therefore, it would have been obvious to one having ordinary skill to provide a reflective area (*e.g.*, hot junctions) overlying a portion of the cold junctions on intermediate conductive surfaces in the method of Peters *et al.*, in order to reduce the influence of stray radiation on the cold junctions (*i.e.*, the cold junctions will be in the shadow of the hot junctions on conductive ridges).

In regard to claims **15** and **16** which are dependent on claim 13, it is inherent in the thermopile of Peters *et al.* that electrically insulated surface sections (without both said first and said second metal layers) are formed at said intermediate conductive surfaces located at surface sections surrounding and adjacent to the thermopile of said base structure since it is clear that the thermopile is of a finite extent and located at one region in order to observe one or a few wavelengths (see column 3, lines 28-31).

In regard to claims **20** and **21** which are dependent on claim 13, the method of Peters *et al.* lacks that the upper surface of respective conductive ridges is covered with a heat-absorbent layer (*e.g.*, carbon); and in that said intermediate conductive surfaces are covered with a heat-reflecting layer (*e.g.*, metal). Baxter teaches (column 3, lines 46-55) to provide a reflective area (*e.g.*, gold) overlying a portion of the cold junctions in order to reduce the influence of stray radiation on the cold junctions. Grinberg *et al.* teach (column 9, lines 60-64; column 11, lines 35-38) that the upper surface of the bridges is covered with a heat-absorbent layer (*e.g.*, carbon black, metallic gold black,

or black paint) in order to increase the temperature variation. Therefore, it would have been obvious to one having ordinary skill to provide a heat-absorbent layer on upper surface of respective conductive ridges and heat-reflecting layer on the cold junctions at intermediate conductive surfaces in the method of Peters *et al.*, in order to reduce the influence of stray radiation and increase the temperature variation as taught by Baxter and Grinberg *et al.*

In regard to claim **22** which is dependent on claim 14, it is inherent in the method of Peters *et al.* that the first metal has a first reflection coefficient and the second metal has a second reflection coefficient. The method of Peters *et al.* lacks to position the surface of said detector relative to incident electromagnetic waves, so that the electromagnetic waves are incident either on the first side surface if the first reflection coefficient is lower than the second reflection coefficient or on the second side surface if the second reflection coefficient is lower than the first reflection coefficient. Baxter teaches (column 3, lines 46-55) to provide a reflective area (*e.g.*, gold) overlying a portion of the cold junctions in order to reduce the influence of stray radiation on the cold junctions. It should be noted that by definition, a material with a low reflection coefficient has less reflected radiation than a material with a higher reflection coefficient. It should also be noted that stray radiation comprises of reflected incident radiation. Therefore, it would have been obvious to one having ordinary skill to position the surface of said detector relative to incident electromagnetic waves in the method of Peters *et al.* so as to provide a reflective area (*e.g.*, the first metal forming the cold junction with a lower reflection coefficient than the second metal forming the cold

junction) overlying a portion of the cold junctions, in order to reduce the influence of stray radiation on the cold junctions.

In regard to claim **23** which is dependent on claim 13, it is inherent in the thermopile in the method of Peters *et al.* that the metal of said first metal layer is different from the metal of said second metal layer, such as to obtain a thermoelectric effect between said first and said second metal layers.

In regard to claim **24** which is dependent on claim 22, the method of Peters *et al.* lacks that said first and second metal layers comprise of gold and chromium. Baxter teaches (column 2, line 65 to column 3, line 40) it is well known in the art that thermopiles comprise of a plurality of hot and cold thermocouple junctions formed by the joining of two electrical conductors of different composition such as for example chromium alloy or gold. Therefore, it would have been obvious to one having ordinary skill to that the thermopile in the method of Peters *et al.* comprise of different types of conductors such as gold and chromium.

In regard to claim **25** which is dependent on claim 1, Peters *et al.* also disclose (column 2, lines 53-57; column 3, lines 28-33) that said base structure (*e.g.*, cover plate or semiconductor substrate; column 2, lines 1-15 and 53-57) includes a surface section intended for two or more detectors (*i.e.*, rows of radiation receivers).

In regard to claim **26** which is dependent on claim 1, Peters *et al.* also disclose (column 2, lines 36-42; column 3, lines 28-33) that said one-piece shaped part (*i.e.*, second part; column 2, lines 53-57) includes a surface section intended for one or more detectors (*i.e.*, one or a few radiation receivers).

19. Claims 27- 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peters *et al.* (US 5,550,375) in view of Baxter (US 4,111,717) and Grinberg *et al.* (US 4,922,116) in so far as understood.

In regard to claim **27**, the method steps are implicit for the apparatus of Peters *et al.* since the structure is the same as the applicant's apparatus of claim 54.

In regard to claims **28**, **30**, and **31**, Peters *et al.* disclose (column 1, line 64 to column 2, line 15; Figs. 2 and 3) a detector in co-action with a gas sensor and intended for detecting electromagnetic waves (column 1, lines 14-20), passing through a gas cell (1, 9, 12), wherein said gas cell defines a cavity which can enclose a volume of gas to be measured or evaluated, wherein a surface, or parts of a surface, that form wall-parts within said gas cell (1, 9, 12) or cavity is/are covered with one or more different metal layers with the intention of forming a surface which is highly reflective with regard to said electromagnetic waves (column 2, lines 31-35), and wherein said detector (8, 11) is a thermal element (*i.e.*, thermopile; column 3, lines 23-26), characterized in that a base section of a base structure (*e.g.*, cover plate or semiconductor substrate; column 2, lines 1-15 and 53-57) exposes said thermal element and forms one part of said gas cell (1, 9, 12), that a one-piece shaped part (*i.e.*, second or further part; column 2, lines 53-57) is formed to enclose said cavity and adapted to cover said base section having said thermal element and that a base structure related area outside said thermal element is used for electronic elements (*i.e.*, circuit arrangements and/or discrete components; column 2, lines 53-57). The apparatus of Peters *et al.* lacks a detailed description of the thermopile being formed on an electrically non-conductive base structure having a

topographical structure covered with a first electrically conductive metal layer and a second electrically conductive layer which are intended to form the thermopile (*i.e.*, thermocouples formed by overlap of the first electrically conductive metal layer and the second electrically conductive layer). Thermopiles are well known in the art. For example, Baxter teaches (column 2, line 65 to column 3, line 40) it is well known in the art that thermopiles comprise of a plurality of hot and cold thermocouple junctions formed by the joining of two electrical conductors of different composition such as for example chromium alloy or gold. Grinberg *et al.* teach an array of resistor bridges (*e.g.*, resistors, thermocouple junctions, Schottky junctions; column 5, lines 66-68) formed on an insulating substrate (column 5, lines 1-4) in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation (column 5, lines 52-55). Therefore, it would have been obvious to one having ordinary skill that the thermopile in the apparatus of Peters *et al.* is formed as an array of resistor bridges (*i.e.*, thermocouple junction comprising overlap of a first electrically conductive metal layer and a second electrically conductive layer) on an insulating substrate (*i.e.*, electrically non-conductive base structure having a topographical structure) in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation as taught by Grinberg *et al.*

In regard to claim **29** which is dependent on claim 28, Peters *et al.* also disclose (column 2, lines 36-57) that said detector (8, 11) can be connected to said one-piece shaped (*i.e.*, second) part via a waveguide (*i.e.*, arranged adjacent and outside) or is integrated directly into (*i.e.*, enclosed by) said one-piece shaped part.

In regard to claim **32** which is dependent on claim 28, Peters *et al.* also disclose (column 2, lines 53-57) to provided within a limited surface area (*i.e.*, semiconductor substrate) a detector (*i.e.*, IR radiation receiver) and electrical conductors and/or electrical circuits and/or electronic circuits (*i.e.*, electronic elements). The apparatus of Peters *et al.* lacks an explicit description that the detector, electrical conductors, electrical circuits, and/or electronic circuits have been provided in the same way. Grinberg *et al.* teach (column 10, lines 37-50) that drive circuits and resistor bridges (*i.e.*, detectors) are provided on a semiconductor substrate using known techniques such as sputtering (*i.e.*, in the same way). Therefore, it would have been obvious to one having ordinary skill to form the thermopile and electronic elements in the apparatus of Peters *et al.* using techniques known in the art such as sputtering.

In regard to claims **33** and **34** which are dependent on claim 32, Peters *et al.* also disclose (column 3, lines 45-58) that the one-piece shaped part has been produced by a LIGA process (*i.e.*, casting against a mold that has a complementary topographic structure, said mold is produced by electroplating process on a model, said model is produced by micromechanically working a substrate, and the configuration of said model is chosen to correspond to desired detector-associated surface parts, electric conductor paths, and/or electrical and/or electronic circuits (column 2, lines 36-57). The apparatus of Peters *et al.* lacks an explicit description that the base structure (*e.g.*, cover plate or semiconductor substrate) has been produced by a LIGA process. Peters *et al.* also teach that the cover plate (12 in Fig. 3) reflects IR radiation (column 5, lines 28-31) and thus functions as an optical element. Peters *et al.* further teach that

optical elements can be directly integrated (column 2, lines 36-42) as a shaped part using the LIGA process (column 3, lines 45-58). Therefore, it would have been obvious to one having ordinary skill to form the base structure in the apparatus of Peters *et al.* using the LIGA process in order to incorporate optical elements as an integrated part of the base structure.

In regard to claim **35** which is dependent on claim 32, Peters *et al.* also disclose (column 2, lines 1-15) that the cover plate (*i.e.*, base structure) is applied to a surface section of the single-piece shaped (*i.e.*, second) part.

In regard to claim **36** which is dependent on claim 28, Peters *et al.* also disclose (column 2, lines 1-15) that a cover plate (*i.e.*, base structure) and surface of the detector form an integral part of the inner surface of said cavity (*i.e.*, in a sealing manner).

In regard to claim **37** which is dependent on claim 35, the apparatus of Peters *et al.* lacks that the surface of the cavity and the detector-associated parts are coated with the same metal. Baxter teaches (column 3, lines 17-31) that the detector-associated parts of a thermopile are coated with a metal that serves the dual purpose of forming a cold thermocouple junction and a heat (*i.e.*, IR radiation) reflector. Peters *et al.* teach (column 2, lines 31-35) that the surface of the cavity should be coated with metal layer having good reflectivity in the spectral range used (*i.e.*, IR radiation). Therefore, it would have been obvious to one having ordinary skill to coat the surface of the cavity and the detector-associated parts in the apparatus of Peters *et al.* with the same metal in order to form the thermocouple junctions of the

thermopile and to obtain a cavity surface having good reflectivity in the spectral range used (*i.e.*, IR radiation).

In regard to claim **38** which is dependent on claim 28, the apparatus of Peters *et al.* lacks that said topographical structure is adapted to provide requisite connection pads belonging to said detector, electric conductor for paths, and/or electric and/or electronic circuits. Grinberg *et al.* teach (column 10, lines 18-30) that the topographical structure is adapted to provide requisite detector connection pads and circuit elements in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation (column 5, lines 52-55). Therefore, it would have been obvious to one having ordinary skill that the topographical structure in the apparatus of Peters *et al.* provides the requisite detector connection pads and circuit elements in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation as taught by Grinberg *et al.*

In regard to claim **39** which is dependent on claim 35, the apparatus of Peters *et al.* lacks that electric conductor paths and/or electric and/or electronic circuits are formed in said second part. Peters *et al.* teach (column 2, lines 36-57) that the detector (8, 11) can be integrated directly into a one-piece shaped (*i.e.*, second) part. Grinberg *et al.* teach (column 10, lines 18-30) that the topographical structure of the detector is adapted to provide requisite detector connection pads and circuit elements in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation (column 5, lines 52-55). Therefore, it would have been obvious to one having ordinary skill that the detector in the apparatus of Peters *et al.* is

integrated directly into a one-piece shaped second part with the requisite detector connection pads and circuit elements in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation as taught by Grinberg *et al.*

In regard to claims **40**, **44**, **45**, and **46** which are dependent on claim 30, the apparatus of Peters *et al.* lacks a detailed description of the thermopile as an array (*i.e.*, n columns by m ridges) of conductive ridges (*i.e.*, having a first side surface coated with a first metal layer, a second side surface coated with a second metal layer, and an upper surface covered by overlap of the first metal layer and the second metal layer to form a thermocouple junction) with each conductive ridge electrically series interconnected by overlap of the first metal layer and the second metal layer (to form a thermocouple junction) at an intermediate conductive surface located between mutually adjacent conductive ridges. Thermopiles are well known in the art. For example, Baxter teaches (column 2, line 65 to column 3, line 40) it is well known in the art that thermopiles comprise of a plurality of hot and cold thermocouple junctions formed by the joining of two electrical conductors of different composition such as for example chromium alloy or gold. Grinberg *et al.* teach an array of resistor bridges (*e.g.*, resistors, thermocouple junctions, Schottky junctions; column 5, lines 66-68) formed on an insulating substrate (column 5, lines 1-4) in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation (column 5, lines 52-55). Therefore, it would have been obvious to one having ordinary skill that the thermopile in the apparatus of Peters *et al.* is formed as an array of conductive ridges

(*i.e.*, having a first side surface coated with a first metal layer, a second side surface coated with a second metal layer, and an upper surface covered by overlap of the first metal layer and the second metal layer to form a thermocouple junction) with each conductive ridge electrically series interconnected by overlap of the first metal layer and the second metal layer (to form a thermocouple junction) at an intermediate conductive surface located between mutually adjacent conductive ridges in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation as taught by Grinberg *et al.*

In regard to claim **41** which is dependent on claim 40, the apparatus of Peters *et al.* lacks that said detector-associated surface parts are positioned relative to incident light rays, or electromagnetic waves, so that said incident light rays will irradiate said upper surface of respective conductive ridges and such that said conductive ridges will shadow said intermediate conductive surfaces against said incident light rays. Baxter teaches (column 3, lines 46-55) to provide a reflective area overlying a portion of the cold junctions in order to reduce the influence of stray radiation on the cold junctions. Therefore, it would have been obvious to one having ordinary skill to provide a reflective area (*e.g.*, hot junctions) overlying a portion of the cold junctions on intermediate conductive surfaces in the apparatus of Peters *et al.*, in order to reduce the influence of stray radiation on the cold junctions (*i.e.*, the cold junctions will be in the shadow of the hot junctions on conductive ridges).

In regard to claims **42** and **43** which are dependent on claim 40, it is inherent in the thermopile of Peters *et al.* that electrically insulated surface sections (without both

said first and said second metal layers) are formed at said intermediate conductive surfaces located at surface sections surrounding and adjacent to the thermopile of said base structure since it is clear that the thermopile is of a finite extent and located at one region in order to observe one or a few wavelengths (see column 3, lines 28-31).

In regard to claims **47** and **48** which are dependent on claim 40, the apparatus of Peters *et al.* lacks that the upper surface of respective conductive ridges is covered with a heat-absorbent layer (*e.g.*, carbon); and in that said intermediate conductive surfaces are covered with a heat-reflecting layer (*e.g.*, metal). Baxter teaches (column 3, lines 46-55) to provide a reflective area (*e.g.*, gold) overlying a portion of the cold junctions in order to reduce the influence of stray radiation on the cold junctions. Grinberg *et al.* teach (column 9, lines 60-64; column 11, lines 35-38) that the upper surface of the bridges is covered with a heat-absorbent layer (*e.g.*, carbon black, metallic gold black, or black paint) in order to increase the temperature variation. Therefore, it would have been obvious to one having ordinary skill to provide a heat-absorbent layer on upper surface of respective conductive ridges and heat-reflecting layer on the cold junctions at intermediate conductive surfaces in the apparatus of Peters *et al.*, in order to reduce the influence of stray radiation and increase the temperature variation as taught by Baxter and Grinberg *et al.*

In regard to claim **49** which is dependent on claim 41, it is inherent in the apparatus of Peters *et al.* that the first metal has a first reflection coefficient and the second metal has a second reflection coefficient. The apparatus of Peters *et al.* lacks to position the surface of said detector relative to incident electromagnetic waves, so that

the electromagnetic waves are incident either on the first side surface if the first reflection coefficient is lower than the second reflection coefficient or on the second side surface if the second reflection coefficient is lower than the first reflection coefficient. Baxter teaches (column 3, lines 46-55) to provide a reflective area (*e.g.*, gold) overlying a portion of the cold junctions in order to reduce the influence of stray radiation on the cold junctions. It should be noted that by definition, a material with a low reflection coefficient has less reflected radiation than a material with a higher reflection coefficient. It should also be noted that stray radiation comprises of reflected incident radiation. Therefore, it would have been obvious to one having ordinary skill to position the surface of said detector relative to incident electromagnetic waves in the apparatus of Peters *et al.* so as to provide a reflective area (*e.g.*, the first metal forming the cold junction with a lower reflection coefficient than the second metal forming the cold junction) overlying a portion of the cold junctions, in order to reduce the influence of stray radiation on the cold junctions.

In regard to claim **50** which is dependent on claim 30, it is inherent in the thermopile in the apparatus of Peters *et al.* that the metal of said first metal layer is different from the metal of said second metal layer, such as to obtain a thermoelectric effect between said first and said second metal layers.

In regard to claim **51** which is dependent on claim 50, the apparatus of Peters *et al.* lacks that said first and second metal layers comprise of gold and chromium. Baxter teaches (column 2, line 65 to column 3, line 40) it is well known in the art that thermopiles comprise of a plurality of hot and cold thermocouple junctions

formed by the joining of two electrical conductors of different composition such as for example chromium alloy or gold. Therefore, it would have been obvious to one having ordinary skill to that the thermopile in the apparatus of Peters *et al.* comprise of different types of conductors such as gold and chromium.

In regard to claim **52** which is dependent on claim 28, Peters *et al.* also disclose (column 2, lines 53-57; column 3, lines 28-33) that said base structure (*e.g.*, cover plate or semiconductor substrate; column 2, lines 1-15 and 53-57) includes a surface section intended for two or more detectors (*i.e.*, rows of radiation receivers).

In regard to claim **53** which is dependent on claim 28, Peters *et al.* also disclose (column 2, lines 36-42; column 3, lines 28-33) that said one-piece shaped part (*i.e.*, second part; column 2, lines 53-57) includes a surface section intended for one or more detectors (*i.e.*, one or a few radiation receivers).

In regard to claim **54**, Peters *et al.* disclose (column 1, line 64 to column 2, line 15; Figs. 2 and 3) a detector intended for detecting electromagnetic waves (column 1, lines 14-20), wherein a cavity (1, 9, 12), which can enclose a volume of gas to be measured or evaluated, have a surface, or parts of a surface, that form wall-parts within said cavity (1, 9, 12) covered with one or more different metal layers with the intention of forming a surface which is highly reflective with regard to said electromagnetic waves (column 2, lines 31-35), and wherein said detector (8, 11) is a bolometer (column 3, lines 23-26), characterized in that a base section of a base structure (*e.g.*, semiconductor substrate; column 2, lines 53-57) exposes said bolometer and forms one part of said gas cell (1, 9, 12), that a one-piece shaped part (*i.e.*, second or further part;

column 2, lines 53-57) is formed to enclose said cavity and adapted to cover said base section having said bolometer and that a base structure related area outside said bolometer is used for electronic elements (*i.e.*, circuit arrangements and/or discrete components; column 2, lines 53-57). The apparatus of Peters *et al.* lacks a detailed description of the bolometer (*i.e.*, being formed as an electrically conductive metal layer on an electrically non-conductive topographical base structure). Bolometers are well known in the art. For example, Grinberg *et al.* teach (column 4, lines 4-12) it is known in the art that a bolometer is a temperature sensitive resistor. Grinberg *et al.* teach an array of resistor bridges (*e.g.*, resistors, thermocouple junctions, Schottky junctions; column 5, lines 66-68) formed on an insulating substrate (column 5, lines 1-4) in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation (column 5, lines 52-55). Therefore, it would have been obvious to one having ordinary skill that the bolometer in the apparatus of Peters *et al.* is formed as an array of resistor bridges (*i.e.*, resistor comprising an electrically conductive metal layer) on an insulating substrate (*i.e.*, electrically non-conductive base structure having a topographical structure) in order to improve thermal dynamic range, speed of response, weight, size, efficiency, and flicker free operation as taught by Grinberg *et al.*

Conclusion

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (703) 308-4860. The examiner can normally be reached on Tuesday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seungsook Ham can be reached on (703) 308-4090. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7724 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

CONSTANTINE HANNAHER
PRIMARY EXAMINER
GROUP ART UNIT 2878

SL
December 20, 2001